Metallurgy Fundamentals 6th edition Brandt Test Bank

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1. The first alloy made was _____.

*a. bronze

b. copper

c. gold

d. tin

2. Which of the following is *not* a metal used by early human beings?

a. Bronze

b. Copper

c. Gold

*d. Titanium

3. During the Bronze Age, _____ was used to make decorative items due to its resistance to tarnishing.

a. bronze

b. copper

*c. gold

d. iron

4. Which of the following is an advantage of using metals for tools instead of stone?

a. They are easier to obtain in nature.

b. They are harder.

*c. They are less brittle.

d. All of the above.

5. The first type of ferrous metal used by early human beings was _____ iron.

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a. bog

b. cast

*c. meteoric

d. pig

6. _____ iron is a ferrous metal that contains iron, about 2%-6% carbon, and often small amounts of silicon and other elements.

a. Bog

*b. Cast

c. Meteoric

d. Wrought

7. _____ iron is a ferrous metal that contains high levels of sulfur.

*a. Bog

b. Cast

c. Meteoric

d. Pig

8. _____ is a ferrous metal that contains very little carbon.

a. Cast iron

b. Pig iron

c. Wootz steel

*d. Wrought iron

9. _____ is a ferrous metal that was used to make strong and flexible swords.

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a. Cast iron

b. Pig iron

*c. Wootz steel

d. Wrought iron

10. Which process was the first method used to produce steel at a low cost?

a. Basic oxygen furnace

*b. Bessemer converter

c. Electric arc furnace

d. Open hearth furnace

11. The _____ produced steel by blowing air through molten pig iron.

a. basic oxygen furnace

*b. Bessemer converter

c. electric arc furnace

d. open-hearth furnace

12. The expanding electricity distribution system provided both the capability of producing and the greater need for high-purity _____.

a. aluminum

*b. copper

c. bronze

d. tin

13. What process of refining dramatically lowered the cost of aluminum, making it practical for consumer applications?

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a. Basic oxygen furnace

b. Electric arc furnace

*c. Hall-Héroult

d. Integrated mill

14. Among the following, which is the fastest method used to produce steel?

*a. Basic oxygen furnace

b. Bessemer converter

c. Puddle iron process

d. Open-hearth furnace

15. The _____ process was the first method used to produce steel made from all scrap steel.

a. basic oxygen furnace

b. Bessemer converter

*c. electric arc furnace

d. open-hearth furnace

16. Electricity is essential for which of the following ferrous metal processes?

a. Bessemer converter

b. Bloomery

c. Basic oxygen furnace

*d. Electric arc furnace

17. Which of the following is currently used to make nearly 70% of US steel?

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a. Basic oxygen furnace

b. Bessemer converter

*c. Electric arc furnace

d. Hall-Héroult process

18. Electricity is essential for smelting _____.

*a. aluminum

b. iron

c. tin

d. All of the above.

19. Continuous casting of steel has mostly replaced the _____ method.

a. direct reduction

b. electrolytic reduction

*c. ingot casting

d. open-face sand casting

20. Which of the following processes is the most recent development in metallurgy?

*a. Additive manufacturing

b. Alloying

c. Continuous casting

d. Smelting

21. Steel was the first alloy made.

a. True
*b. False

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22. Smelting is the process of converting metal scrap into new metal.

a. True
*b. False

23. Bronze is an alloy of copper and tin.

*a. True
b. False

24. Wrought iron is harder than cast iron.

a. True
*b. False

25. Wrought iron was produced before steel was.

*a. True
b. False

26. Steel has a higher carbon content than pig iron.

a. True
*b. False

27. The open-hearth furnace makes steel more quickly than the basic oxygen furnace.

a. True
*b. False

28. The open-hearth furnace is the most common method of steelmaking today.

a. True
*b. False

29. Integrated steel mills make most of the steel in the US today.

a. True
*b. False

30. Minimills use the electric arc furnace for steelmaking.

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*a. True
b. False

31. Carbon is an important alloying element of iron.

*a. True
b. False

32. Aluminum is produced using the direct reduction process.

a. True
*b. False

33. Aluminum is produced using an electrolytic refining process.

*a. True
b. False

34. Direct reduction of iron uses coke for smelting.

a. True
*b. False

35. Direct reduction of iron creates less pollution than other current steelmaking processes.

*a. True
b. False

36. Match the definitions to the corresponding terms. Answers are used only once.

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[c] 1. Process of combining metals

[b] 2. Stringers of iron

[a] 3. Block of metal that can be processed to produce a new shape

[d] 4. Leftover material once a metal has been separated from its ore

[f] 5. Process of using heat to extract metals from their ores

a. Ingot

b. Blooms

c. Alloying

d. Slag

e. Open-face sand mold

f. Smelting

37. Match the definitions to the corresponding terms. Answers are used only once.

[f] 1. Nails, horseshoes, and tools were made from this high-sulfur iron

[c] 2. Alloy of copper and tin

[d] 3. Iron product containing about 2%–6% carbon

[b] 4. Superior swords were made from this higher-carbon, slag-free metal

[e] 5. Spongy iron product left after hammering and reheating to drive out slag

a. Puddle iron

b. Wootz steel

c. Bronze

d. Cast iron

e. Wrought iron

f. Bog iron

38. Explain the process of direct reduction and the benefits of this process.

Correct Answer:
Direct reduction uses methane, carbon monoxide, and hydrogen to remove oxygen from iron ore while in its solid state, without the need for melting. The direct reduction of iron ore to high-purity iron avoids the cost and pollution of blast furnaces and coke production.

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39. Explain the differences in the Bessemer converter and the basic oxygen furnace steelmaking processes.

Correct Answer:
The Bessemer converter uses air to burn off impurities and produces lower-quality steel. The BOF uses purified oxygen instead of air, so it does not cool off the steel as much and it contains less contamination. The BOF is a common process today, but the Bessemer converter is an obsolete process.

40. Explain how new refining methods affect the cost of metals. How does this affect the applications for metals?

Correct Answer:
New processes can produce metals at lower cost—soften much lower costs. This allows engineers to change from using one material to a different one that has better properties. This can make finished products safer, lighter in weight, and lower in cost.

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